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**CONSTITUTION:** The objective flame-retardant resin composition is composed of 20 to 80wt.% polyethylene terephthalate (based on the whole composition, hereinafter used in the same mean), ≤60wt.% inorganic filler, 2 to 25wt.% brominated flame-retardant, 2 to 15wt.% antimony-based flame retardant and 0.05 to 10wt.% polytetrafluoroethylene resin produced by emulsion polymerization method.

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CLAIMS

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[Claim(s)]

[Claim 1] The flame-retardant-resin constituent which consists of 0.05 - 10 % of the weight (all inside of a constituent) of polytetrafluoroethylene resin manufactured by 20 - 80 % of the weight (all inside of a constituent) of polyethylene terephthalate, 60 % of the weight (all inside of a constituent) of inorganic bulking agents, 2 - 25 % of the weight (all inside of a constituent) of bromination polystyrene, 2 - 15 % of the weight (all inside of a constituent) of antimony system fire retardancy assistants, and the emulsion-polymerization method.

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[Detailed Description of the Invention]

[Industrial Application] This invention relates to a fire-resistant polyethylene-terephthalate-resin constituent. It excels in mechanical strength, fire retardancy, a fluidity, an appearance, etc. in more detail, and is related with a resin constituent with little weld flash.

[Description of the Prior Art] Polyethylene terephthalate is conventionally used for extensive applications, such as an automobile, and electrical and electric equipment, electronic parts, as engineering plastics taking advantage of the outstanding thermal resistance, the mechanical characteristic, and the electrical property.

[0003] The constituent which mainly blended the organic halogen series flame retardant and the antimony system fire retardancy assistant to the application as which the fire retardancy of an electrical part etc. is generally required, and gave fire retardancy has been used. Moreover, many amount of macromolecules type bromine system flame retarders are used also in the flame retarder now for a mechanical strength, fire-resistant improvement, or the improvement in a surface appearance.

[0004] And the property required of resin in connection with the miniaturization of electronic parts, such as a switch, a connector, and a relay, and thinning is also becoming severe, and recently requires properties, such as the outstanding mechanical property and not only electrical characteristics but a high fluidity, low weld flash nature, etc., increasingly.

[0005] In order to give these functions to a resin constituent, selection of the additive appropriate for the purpose becomes important. Especially a flame retarder also has comparatively many additions also in an additive, and it is one of the additives which have large influence on the property of a resin constituent. As a bromine system flame retarder above-mentioned amount of giant molecules type, it divides roughly into a current aromatic polyester system resin constituent, and four kinds of flame retarders, such as a bromination bisphenol A mold polycarbonate resin system, a bromination bisphenol A epoxy resin system, a bromination polystyrene resin system, and a bromination polyphenylene ether resin system, are used for it. In order to give a high fluidity to a resin constituent among these, a bromination polystyrene resin system is best and lacks in a fluidity in other constituents. But although a fluidity improves, as for bromination polystyrene resin, there is no \*\*\*\*\* effectiveness in control of weld flash. Then, development of the fire-resistant polyethylene terephthalate system resin constituent with which can be satisfied of a fluidity and low weld flash nature has been desired.

[Means for Solving the Problem] This invention was equipped with the outstanding mechanical property, fire retardancy, and a fluidity, and as a result of repeating examination in order to obtain a flame-retardant-resin constituent with little weld flash, it reached this invention.

[0007] 0.05 - 10 % of the weight (all inside of a constituent) of namely, polytetrafluoroethylene resin which manufactured this invention by (A) polyethylene terephthalate 20 - 60 or less (all inside of a constituent) % of the weight of 80-% of the weight (all inside of constituent), and (B) inorganic bulking agents, 2 - 25 % of the weight (all inside of a constituent) of (C) brominated flame retardants, 2 - 15 % of the weight (all inside of a constituent) of (D) antimony system fire retardancy assistants, and (E) emulsion-polymerization method -- since -- it is the becoming flame-retardant-resin constituent.

[0008] Hereafter, each constituent of the flame-retardant-resin constituent of this invention is explained in detail.

[0009] First, (A) polyethylene terephthalate (it may be written as "PET" below) used for this invention is an esterification reaction or a polymer which is made to carry out an ester exchange reaction, is subsequently made to carry out a polycondensation reaction, and is obtained about the dicarboxylic acid with which for example, at least 90-



A fluidity will be spoiled, if there is no effectiveness of weld flash reduction and it exceeds 10 % of the weight, when there are few additions than 0.05 % of the weight.

[0024] Since a desired property is further given to the polyethylene-terephthalate-resin constituent of this invention according to the purpose, of course, it is also possible to blend a well-known additive, for example, lubricant other than the aforementioned component, a nucleating additive, a release agent, an antistatic agent, a surfactant, a plasticizer, a coloring agent, a heat-resistant stabilizer, UV stabilizer, an impact amelioration agent, a crystallization accelerator, etc.

[0025] The polyethylene-terephthalate-resin constituent of this invention can be easily prepared by the well-known facility and well-known approach which are generally used as the conventional resin constituent method of preparation. the approach of carrying out \*\*\*\* extrusion with an extruder, preparing a pellet, and fabricating the appropriate back, after mixing 1 each component and 2 -- the pellet with which presentations once differ is prepared and the approach of carrying out specified quantity mixing of the pellet, presenting shaping, and obtaining the mold goods of the purpose presentation after shaping, the approach of teaching 1 of each component or 2 or more directly to three making machines, etc. can use all. [ for example, ] Moreover, it is an approach desirable when performing homogeneity combination of these components to mix a part of resinous principle with components other than this as fine fine particles, and to add.

[0026] Hereafter, an example explains this invention still more concretely.

[0027] Moreover, the measuring method of characterization shown in the example is as follows.

[0028] \*\* Physical-properties measuring method tension test ASTM D It is conformity Izod impact strength to 638. ASTM D It is conformity [0029] to 256. \*\* The stagnation trial in a making machine (thermal stability)

It fabricated, after making a sample pile up in a making machine cylinder for 30 minutes at 280 degrees C of cylinder temperatures, and the tensile strength of a shaping test piece was measured, and it considered as thermal stability and the standard which evaluates extent of degradation.

[0030] \*\* An inflammable test (UL-94)

According to the approach of the subject 94 (UL-94) of Underwriters Laboratories, it examined about fire retardancy using five test pieces (thickness: 1/32 inch).

[0031] \*\* It fabricated on the following conditions using the fluid trial metal mold for measuring method rod flow length measurement (mold cavity : 0.7mm in width-of-face [ of 10mm ] x thickness), and the fluidity was evaluated from the flow length (mold-goods die length).

process condition: -- cylinder-temperature: -- 280-degree-C injection pressure : 100kg/cm<sup>2</sup> die temperature : 80 degrees C [0032] \*\* The mold-goods visual-inspection disk (the diameter of 100mm, thickness of 3mm) was

fabricated, the existence of a unique spot and extent were observed visually, and it judged according to the following ranks.

spot: -- O-:-less \*\*: -- a few -- it is -- those with x:large number [0033] \*\* It considered that the mold goods of bar flow length with a weld flash evaluation thickness of 0.05mm were weld flash, and asked for the weld flash characteristic as compared with bar flow length with a thickness of 0.5mm. A process condition is the cylinder temperature of 280 degrees C, the die temperature of 120 degrees C, and the 400 kgf/cm injection pressure 2. And it is injection-speed 100 mm/min (it is shown that there is so little weld flash that a characteristic is low).

Weld flash characteristic =(bar flow length with a thickness of 0.05mm)/(bar flow length with a thickness of 0.5mm) x100[0034]

[Examples 1-9 and the examples 1-9 of a comparison] After adding the various components shown in Table 1 or 2 to the polyethylene terephthalate of intrinsic viscosity (inside of 35 degrees C and orthochromatic chlorophenol) 0.7 and mixing to it, the constituent of a pellet type was prepared using the extruder. Subsequently, using this pellet, from this pellet, various test pieces were created with injection molding, and said evaluation was performed. The result was shown in Table 1 or 2.

[0035]

[Table 1]

		単位	実施例1	実施例2	実施例3	実施例4	実施例5	実施例6	実施例7	実施例8	実施例9
組成	(A) ポリエチレンテレフタレート	重量%	56.0	46.0	56.0	56.0	56.0	56.0	56.95	56.7	52.0
	(B) ガラス繊維	"	30.0	20.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0
	マイカ	"	-	20.0	-	-	-	-	-	-	-
	(C) 臭素化ポリスチレン	"	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
	(D) $Sb_2O_3$	"	3.0	-	-	-	-	-	-	-	-
	$Sb_2O_4$	"	-	-	3.0	-	-	-	-	-	-
	$Sb_2O_5$	"	-	-	-	3.0	-	-	-	-	-
	$(Na_2O)_{0.75}Sb_2O_5$	"	-	-	-	-	3.0	-	-	-	-
	$NaSbO_3$	"	-	3.0	-	-	-	3.0	3.0	3.0	3.0
	(E) ポリテトラフルオロエチレン (乳化重合)	"	1.0	1.0	1.0	1.0	1.0	1.0	0.05	0.3	5.0
	(懸濁重合)	"	-	-	-	-	-	-	-	-	-
品質	引張強度	kg/cm <sup>2</sup>	2300	1600	2400	2300	2100	2300	2200	2300	2400
	引張伸度	%	5.9	4.7	5.8	5.6	5.4	5.7	5.8	5.7	5.6
	アイゾット衝撃強度 (ノッチ無)	kg·cm/cm <sup>2</sup>	90	65	85	87	78	88	86	85	91
	成形機内滞留試験 (引張強度)	kg/cm <sup>2</sup>	2150	1500	2300	2200	2000	2300	2150	2200	2300
	燃焼性試験 (UL94)	-	V-0	V-0	V-0	V-0	V-0	V-0	V-0	V-0	V-0
	流動性	mm	440	300	410	400	470	430	410	450	400
	成形品外観試験 (斑点)	-	○	○	○	○	○	○	○	○	○
	バリ試験	-	1.2	1.4	1.2	1.3	1.3	1.3	2.0	1.7	1.0

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[0036]

[Table 2]

組成	単位	比較例1	比較例2	比較例3	比較例4	比較例5	比較例6	比較例7	比較例8	比較例9
(A) ポリエチレンテレフタレート	重量%	64.5	39.0	57.0	56.0	57.5	42.0	56.97	45.0	52.0
(B) ガラス繊維 マイカ	"	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0
(C) 臭素化ポリスチレン	"	—	—	—	—	—	—	—	—	—
(D) $Sb_2O_3$ $Sb_2O_4$ $Sb_2O_5$ ( $Na_2O$ ) $0.75Sb_2O_5$ $NaSbO_3$	"	1.5	27.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
(E) ポリテトラフルオロエチレン (乳重合)	"	3.0	3.0	3.0	3.0	1.5	17.0	3.0	3.0	3.0
" (懸濁重合)	"	1.0	1.0	—	—	1.0	1.0	0.03	12.0	—
品質	"	—	—	—	1.0	—	—	—	—	5.0
引張強度	kg/cm <sup>2</sup>	2500	1000	2300	1800	2200	1200	2400	2500	1200
引張伸度	%	5.1	4.7	5.5	4.3	5.0	4.5	5.2	5.0	4.5
アイゾット衝撃強度 (ノッチ無)	kg·cm/cm <sup>2</sup>	93	50	85	65	75	50	85	93	60
成形機内滞留試験 (引張強度)	kg/cm <sup>2</sup>	2400	600	2100	1600	2100	800	2200	2350	1000
燃焼性試験 (UL94)	—	V-2	V-0	V-0	V-0	V-2	V-0	V-0	V-0	V-0
流動性	mm	440	530	410	420	380	510	450	110	510
成形品外観試験 (斑点)	—	○	△	○	○	○	△	○	○	△
バリ指数	—	1.4	2.7	5.5	3.5	1.4	1.5	3.8	0.7	4.2

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[0037]

[Effect of the Invention] The flame-retardant-resin constituent of this invention has the function in which the property shown below has been improved effectively.

1. It has the outstanding fire retardancy.
2. There is little heat deterioration of mold goods and there are also few falls on the strength.
3. Mechanical properties, such as tractive characteristics and Izod impact strength, are excellent.
4. There is very little weld flash of mold goods.



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